The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TODOR G. GEORGIEV

Appeal 2007-0337
Application 09/996,200
Technology Center 2600

Decided: February 22, 2007

Before KENNETH W. HAIRSTON, ALLEN R. MACDONALD, and JAY P. LUCAS, *Administrative Patent Judges*.

MACDONALD, *Administrative Patent Judge*.

DECISION ON APPEAL

This appeal involves claims 1-6, 10-21, and 25-39. Claims 7-9 and 22-24 have been indicated as containing allowable subject matter (Br. 2;

Answer 3, 19). We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b).

INTRODUCTION

The claims are directed to distorting an image for visual effect. Specifically, the invention calculates a distortion of a certain area of the image, extracts at least one component of the distortion, and applies the extracted component(s) to another area of the image. The user can therefore easily select some or all of the individual distortion components via a menu and apply the selected component(s) to other areas of the image. Claim 1 is illustrative:

> 1. A method comprising:
> in response to user action on a canvas, selecting at least one area of a first image which relates to an area on a distortion grid;
> using a plurality of points local to the at least one area to calculate a distortion;
> extracting at least one component of the distortion; and
> applying the at least one component to a second area of the first image.

The Examiner relies on the following prior art references to show unpatentability:

Choi	US 6,157,750	Dec. 5, 2000
Reyzin	US 6,215,915 B1	Apr. 10, 2001

Bruce H. Thomas & Paul Calder, *Animating Direct Manipulation Interfaces*, UIST '95, ACM, Nov. 14-17, 1995 ("Thomas").

James D. Foley, et al., *Computer Graphics: Principles and Practice*, 2d ed., Addison-Wesley Pub. Co., Jul. 1997, pp. 206, 1104, 1108-09 ("Foley").

The rejections as presented by the Examiner are as follows:

1. Claims 1-3, 10, 11, 13-18, 25, 26, 28-32, 34, 35, and 37-39 are rejected under 35 U.S.C. § 102(b) as being anticipated by Thomas.
2. Claims 4, 19, and 36 are rejected under 35 U.S.C. § 103(a) as unpatentable over Thomas in view of Reyzin.
3. Claims 5 and 6 are rejected under 35 U.S.C. § 103(a) as unpatentable over Thomas in view of Foley.
4. Claims 20 and 21 are rejected under 35 U.S.C. § 103(a) as unpatentable over Thomas in view of Reyzin and further in view of Foley.
5. Claims 12, 27, and 33 are rejected under 35 U.S.C. § 103(a) as unpatentable over Thomas in view of Choi.

Rather than repeat the arguments of Appellant or the Examiner, we refer to the Briefs and the Answer for their respective details. In this decision, we have considered only those arguments actually made by Appellant. Arguments which Appellant could have made but chose not to make in the Briefs have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii) (2004).

OPINION

It is our view, after consideration of the record before us, that the disclosure of Thomas fully meets the invention set forth in claims 1-3, 10, 11, 13, 16-18, 25, 26, 28, 31, 32, 34, 35, and 37. We reach the opposite conclusion, however, with respect to claims 14, 15, 29, 30, 38, and 39. We also conclude that the evidence relied upon and the level of skill in the particular art would have suggested to one of ordinary skill in the art the

invention set forth in claims 4, 5, 12, 19, 20, 27, 33, and 36. We reach the opposite conclusion, however, with respect to claims 6 and 21. Accordingly, we affirm-in-part.

Language of Claim 31

Before turning to the merits of the appeal, we first address a discrepancy in the language of claim 31 as presented in the Brief and the Examiner's Answer. The Examiner alleges that claim 31 in the Brief's Evidence Appendix is erroneous in reciting "'the first image being related to an area on a distortion grid'" since the Amendment filed Dec. 29, 2003 does not contain this limitation. The Examiner then rewrote the claim omitting the limitation (Answer 3).

Based on the record before us, we will not adopt the Examiner's version of claim 31 as rewritten in the Answer and will presume the version as presented in the Brief is correct. Although the Examiner is correct regarding the Dec. 2003 Amendment, the language of claim 31 filed with a subsequent Amendment contains the disputed limitation. *See* Amendment filed Apr. 15, 2004. Although the inserted limitation did not strictly comply with Amendment format requirements (i.e., the added text was not underlined), it was nevertheless entered into the record as of the Apr. 2004 Amendment. Significantly, Appellant argued in the accompanying remarks that the prior art did not disclose a distortion grid – a feature recited in the newly-added limitation of claim 31. *See* Remarks Accompanying Apr. 2004 Amendment, at 9. Furthermore, Appellant referred to the amended version of claim 31 in an earlier-filed Brief that the Examiner acknowledged as correct. *See* Brief filed Oct. 12, 2004, at 20 (including disputed limitation in

claim 31); Examiner's Answer filed Mar. 21, 2005, at 4 (acknowledging Appellant's claim listing in the Brief as correct).

Although Appellant did not respond to the Examiner's redrafting of claim 31 in the Reply Brief, we nonetheless presume that Appellant's listing of claim 31 in the Brief is correct based on the record before us.

Anticipation Rejection

We now consider the Examiner's rejection of claims 1-3, 10, 11, 13-18, 25, 26, 28-32, 34, 35, and 37-39 under 35 U.S.C. § 102(b) as being anticipated by Thomas. Anticipation is established only when a single prior art reference discloses, expressly or under the principles of inherency, each and every element of a claimed invention as well as disclosing structure which is capable of performing the recited functional limitations. *RCA Corp. v. Applied Digital Data Systems, Inc.*, 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir. 1984); *W.L. Gore and Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1554, 220 USPQ 303, 313 (Fed. Cir. 1983).

The Examiner has indicated how the claimed invention is deemed to be fully met by the disclosure of Thomas (Answer 4-10). Regarding representative claim 1,[1] Appellant argues that Thomas does not disclose (1) using plural points local to an area of an image to calculate distortion; (2) extracting a component of the distortion; and (3) applying the extracted component to a different area of the image as claimed (Br. 8). According to Appellant, Thomas merely animates an undistorted object during its enlargement, movement, or rotation. Appellant emphasizes that, unlike

[1] Appellant indicates that claim 1 is representative of the group comprising claims 1, 2, 10, 11, 16, 17, 25, 26, 31, 32, and 34 (Br. 8).

Thomas, the claimed invention stores distortion information to permit extracting a selected distortion component (Br. 10; Reply Br. 1-3).

The Examiner responds that Thomas in Fig. 3 teaches distorting the corner portion of the image when the user grabs a corner portion with the mouse. As a result, all four corners are similarly distorted. Such a feature, according to the Examiner, fully meets the disputed limitations of claim 1 (Answer 17-18).

We will sustain the Examiner's rejection of claim 1. We agree with the Examiner that Thomas' object animation fully meets the claim, particularly Thomas' animated scaling operation. As best seen in Fig. 3, when the user grabs a corner of the image, the mouse controls the part of the object that is grabbed, but the bulk of the image lags behind. This animation effectively distorts the image to exaggerate the effect of scaling the image. Significantly, the image distortion at one corner caused by moving the mouse is essentially duplicated at the other three corners of the image (Thomas 5; Fig. 3).

To achieve this distortion, Thomas applies a warping transformation to the coordinate system and draws the image on the warped coordinate system (Thomas 6). For each frame of interaction, warp vectors are calculated and placed at vertexes of the object. A zero magnitude vector is placed at the vertex that is grabbed by the mouse (Thomas 7; Figs. 7-8).

Thomas' warp vector calculation, in our view, calculates a distortion by using plural points local to at least one area of the image as claimed. In the image shown in Fig. 3, for example, the extent of mouse movement essentially dictates the amount of distortion. By moving the mouse in an area adjacent to the corner region of the image, Thomas' distortion

calculation inherently uses multiple points local to an area of the image as claimed. Furthermore, the warp vectors inherently have corresponding "components" (e.g., x and y components) that are extracted and applied to other areas of the image to animate the image in a manner commensurate with the desired image operation. *See* Thomas, Fig. 8 (showing warp vectors at three corners of image with similar x and y components for a move operation). This application of the "extracted" distortion component is evident from the commensurate distortion of all four corners in Thomas' scaling operation shown in Fig. 3.

Appellant's argument that Thomas does not extract a component of the distortion is simply not commensurate with the scope of the claim language. A "component" of the distortion is fully met by a component of a warp vector that is calculated responsive to a desired image operation.

Because Thomas discloses all limitations of representative claim 1, we will sustain the Examiner's anticipation rejection of that claim. Since claim 1 is representative of the group including claims 2, 10, 11, 16, 17, 25, 26, 31, 32, and 34, those claims fall with claim 1.

Regarding claims 3, 18, and 35,[2] Appellant argues that although Thomas discloses affine transformations that can be applied to an object, the reference does not disclose calculating an affine transform from a plurality of points as claimed (Br. 10-11). The Examiner responds that an affine transformation inherently involves plural points since (1) a matrix is used, and (2) each matrix element represents a transformation of a point (Answer 18).

[2] Appellant indicates that claim 3 is representative of this claim grouping (Br. 10).

We will sustain the Examiner's rejection of claims 3, 18, and 35. Thomas' original Transformer object supported only affine transformations such as rotation, scaling, and translation (Thomas 7). Thomas notes that affine mappings can be computed as matrix products in a homogeneous coordinate system. As a result, a sequence of affine mappings can be represented as a single matrix operation (Thomas 8). Although warp mapping is not affine, it is nevertheless combined with affine transformations in a process that applies each transformation in turn (*Id.*). In our view, Thomas' scaling operation with affine transformation that utilizes a matrix (i.e., a plurality of points) and which also warps the image fully meets calculating an affine transform from the plurality of points as claimed given the scope and breadth of the limitation. The Examiner's anticipation rejection of claims 3, 18, and 35 is therefore sustained.

Regarding claims 13, 28, and 37,[3] Appellant argues that Thomas does not disclose extracting a component of distortion, much less applying the extracted component to the entire image. The Examiner responds by noting that the entire object in Fig. 1 is distorted. The Examiner also refers to Figs. 3 and 4 (Answer 18).

We will sustain the Examiner's rejection of claims 13, 28, and 37. For the reasons previously discussed, we find that Thomas reasonably teaches extracting and applying a component of distortion.[4] For example, Thomas' scaling operation in Fig. 3 and movement operation in Fig. 8 applies the distortion component to the entire image. Because all limitations

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[3] Appellant indicates that claim 13 is representative of this claim grouping (Br. 11).

[4] *See* P. 6-7, *supra*, of this decision.

are fully met by Thomas, we will sustain the Examiner's anticipation rejection of claims 13, 28, and 37.

Regarding claims 14, 15, 29, 30, 38, and 39,[5] Appellant argues that Thomas does not disclose extracting a component of distortion, much less applying the extracted component to a second image (Br. 12). The Examiner contends that because Thomas' editor can create figures such as lines and polygons, the reference "implies a plurality of objects can exist on a display" (Answer 18).

We will not sustain the Examiner's rejection of claims 14, 15, 29, 30, 38, and 39. Significantly, claim 14 effectively requires applying the at least one component to two images: a first image *and* a second image. Independent claim 1 recites that the extracted component is applied to a second area of the first image. Claim 14 depends from claim 1 and recites applying the extracted component to a second image. Thus, dependent claim 14 effectively requires applying the component to a second image in addition to the first image.

Turning to Thomas, nothing in the reference expressly or inherently teaches this limitation. At best, Thomas applies an extracted distortion component to a single image – not multiple images. Even if Thomas' editor can edit and display multiple objects as the Examiner alleges, such a multiple-image display hardly requires applying a distortion component extracted from one image and applying that extracted component to the same image *and* another image as claimed.

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[5] Appellant indicates that claim 14 is representative of this claim grouping (Br. 12).

Because Thomas fails to disclose all limitations of representative claim 14, we will not sustain the Examiner's anticipation rejection of claims 14, 15, 29, 30, 38, and 39.

Obviousness Rejections

We now consider the rejection of claims 4, 19, and 36[6] under 35 U.S.C. § 103(a) as unpatentable over Thomas in view of Reyzin. In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. *See In re Fine*, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). If that burden is met, the burden then shifts to the applicant to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. *See In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); *In re Hedges*, 783 F.2d 1038, 1039, 228 USPQ 685, 686 (Fed. Cir. 1986); *In re Piasecki*, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); and *In re Rinehart*, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976).

Regarding representative claim 4, the Examiner's rejection essentially finds that Thomas teaches every claimed feature except extracting further comprising decomposing the affine transform into a translation and a linear transform matrix. The Examiner cites Reyzin as teaching such a feature and concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate such a teaching into Thomas'

[6] Appellant indicates that claim 4 is representative of this claim grouping (Br. 13).

image distortion method to enhance analysis of the transformation (Answer 10-11, 19). Appellant argues that the prior art does not disclose or suggest extracting a component of a distortion by calculating an affine transform from a plurality of points, much less decomposing the affine transform into a translation and a linear transform matrix (Br. 13-14).

We will sustain the Examiner's rejection of claims 4, 19, and 36. We first note that Thomas reasonably discloses extracting a component of a distortion by calculating an affine transform from a plurality of points for the reasons previously discussed.[7] Reyzin discloses an affine transformation of an image to be concurrently rotated, scaled, or otherwise transformed. To this end, Reyzin provides a sequence of one-dimensional affine transformations along different axes that more efficiently executes general affine transforms (Reyzin, abstract; col. 2, ll. 5-26). As the Examiner indicates, Reyzin's affine transformation utilizes a transformation matrix, M, and an offset (x_0, y_0). Such a teaching, in our view, would have amply suggested resolving an affine transformation into a linear transform matrix and a translation as claimed. Moreover, Appellant has simply not rebutted the Examiner's rationale for combining Reyzin with Thomas – a position that we find reasonable. The Examiner's obviousness rejection of claims 4, 19, and 36 is therefore sustained.

We next consider the Examiner's rejection of claims 5 and 6 under 35 U.S.C. § 103(a) as unpatentable over Thomas in view of Foley. Regarding claim 5, the Examiner finds that Thomas discloses all claimed subject matter except for the extraction of magnification comprising calculating the determinant of a linear transform matrix. The Examiner cites Foley as

[7] *See* P. 8, *supra*, of this opinion.

teaching that the determinant of a matrix indicates the extent of expansion or contraction of a cube. The Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate Foley's teaching in Thomas' method to determine transform magnification (Answer 13, 19).

Appellant argues that neither Thomas nor Foley extract a magnification component of a distortion by calculating an affine transform from a plurality of points and calculating the determinant of a linear transformation matrix as claimed (Br. 14-15).

We will sustain the Examiner's rejection of claim 5. Appellant has simply not persuasively rebutted the Examiner's prima facie case of obviousness apart from merely arguing that the prior art does not disclose or suggest the claimed limitations. We see no reason why the skilled artisan would not have relied on the teachings of Foley in calculating a determinant of the matrix and apply such a teaching in Thomas' method essentially for the reasons stated by the Examiner. The Examiner's prima facie case based on the combined teachings of the cited references has not been rebutted. Accordingly, we will sustain the Examiner's rejection of claim 5. Since claim 5 is representative of the group comprising claims 5 and 20,[8] we likewise sustain the Examiner's rejection of claim 20.

Regarding claim 6, the Examiner finds that Thomas discloses all of the claimed subject matter except the extraction of rotation comprising calculating an angle from the elements of a linear transform matrix. The Examiner cites Foley as teaching deriving an angle of rotation from an affine

[8] Appellant indicates that claim 5 is representative of the group consisting of claims 5 and 20 (Br. 14).

transformation. The Examiner then concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate such a teaching into Thomas' method to determine the amount of rotation due to the transformation (Answer 12-13).

Appellant argues that although Foley derives a rotation equation, the prior art does not disclose extracting a rotation component of a distortion by calculating an angle from the elements of a linear transform (Br. 15). The Examiner responds that the rotation angle θ in Foley "can be derived by simple mathematical manipulation" (Answer 19).

We will not sustain the Examiner's rejection of claim 6. Although Foley discloses a method for deriving an equation for rotating points of an image through an angle θ, the reference does not disclose calculating the angle from the elements of a linear transform matrix as claimed. Rather, Foley states that positive angles of rotation are measured counterclockwise from x towards y (Foley, Equations (5.6) through (5.9); Figs. 5.3-5.4).

Although the skilled artisan could rearrange Foley's equations to solve for the rotation angle θ in terms of the other variables, the Examiner has simply not articulated on this record – nor can we ascertain – *how* such an angle calculation would be combinable with Thomas' distortion component extraction method utilizing a matrix-based affine transformation and which also warps the image. Merely because all claimed elements or steps appear in the prior art is not per se sufficient to establish that it would have been obvious to combine those elements. *United States v. Adams*, 383 U.S. 39 (1966). *See also Smith Industries Medical Systems, Inc. v. Vital Signs, Inc.*, 183 F.3d 1347, 1356, 51 USPQ2d 1415, 1420 (Fed. Cir. 1999).

The Examiner's obviousness rejection of claim 6 is therefore reversed. Since claim 6 is representative of the group comprising claims 6 and 21,[9] we likewise reverse the Examiner's rejection of claim 21.

We next consider the Examiner's rejection of claims 12, 27, and 33[10] under 35 U.S.C. § 103(a) as unpatentable over Thomas in view of Choi. Regarding representative claim 12, the Examiner finds that Thomas discloses all claimed subject matter except for the user selecting the area for applying by the location of a virtual brush. The Examiner cites Choi as disclosing such a feature and concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate such a teaching in Thomas to select a desired amount of transformation area (Answer 15). Appellant argues that Choi does not disclose a virtual brush that enables the user to select the area to which the extracted component is applied (Br. 17). The Examiner responds that since both a conventional computer mouse and a virtual brush are used for pointing purposes, it would have been obvious to the skilled artisan to replace the mouse with a virtual brush for pointing purposes (Answer 20).

We will sustain the Examiner's rejection of claims 12, 27, and 33. At the outset, we note that the term "virtual brush" is extremely broad. In interpreting the term "virtual brush," we note that Appellant's Specification states that virtual brush shapes can be a circle, square, or *a single pixel* (Specification 3:16-19; emphasis added). In our view, a computer mouse,

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[9] Appellant indicates that claim 6 is representative of the group consisting of claims 6 and 21 (Br. 15).
[10] Appellant indicates that claim 12 is representative of this claim grouping (Br. 16).

such as that used in Thomas,[11] reasonably meets this description. In short, we find that Thomas alone amply would have suggested using a "virtual brush" to select the area for applying the distortion component. Thus, we sustain the Examiner's obviousness rejection based on the teachings of Thomas alone because the Board may rely on fewer references than the Examiner in affirming a multiple-reference rejection under 35 U.S.C. § 103. *In re Bush,* 296 F.2d 491, 496, 131 USPQ 263, 266-67 (CCPA 1961); *In re Boyer*, 363 F.2d 455, 458 n.2, 150 USPQ 441, 444 n.2 (CCPA 1966).

DECISION

We affirm the Examiner's rejections with respect to claims 1-5, 10-13, 16-20, 25-28, and 31-37. However, we reverse the Examiner's rejections of claims 6, 14, 15, 21, 29, 30, 38, and 39. Accordingly, we affirm-in-part.

[11] *See* Thomas 5, col. 2, ll. 5-6 (noting that the part of the object that is "grabbed" is controlled by a mouse).

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv) (2004).

AFFIRMED-IN-PART

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